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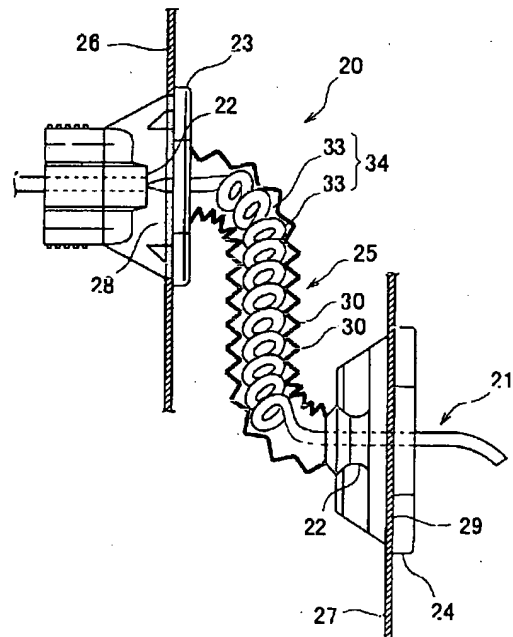
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(54) 【発明の名称】 グロメットの電線配索構造およびその電線配索方法

(57) 【要約】

【課題】 グロメット内に配索される電線の摩耗や破損、断線を防止できるグロメットの電線配索構造を提供する。

【解決手段】 伸縮可能なグロメット20内に電線21を挿通したグロメットの電線配索構造であって、グロメット20内に挿通される電線21に螺旋状にループ33を複数形成して伸縮自在部とした。このため、グロメット20内に配索された電線がグロメット20の屈曲、伸縮に追従でき、摩耗や破損ならびに断線を防止することができる。



## 【特許請求の範囲】

【請求項1】 伸縮可能なグロメット内に電線を挿通したグロメットの電線配索構造であって、前記グロメット内に挿通させる前記電線に伸縮自在部を設けたことを特徴とするグロメットの電線配索構造。

【請求項2】 請求項1記載のグロメットの電線配索構造であって、

前記伸縮自在部が、ループ部であることを特徴とするグロメットの電線配索構造。

【請求項3】 請求項2記載のグロメットの電線配索構造であって、

前記ループ部の電線が、グロメットの内側面に密着していることを特徴とするグロメットの電線配索構造。

【請求項4】 伸縮可能なグロメット内に電線を挿通したグロメットの電線配索方法であって、

棒状の電線配索治具の一方端から他方端に向けて電線を巻き回した後、

前記電線配索治具を前記グロメットの一方の電線挿通孔から挿入し、前記電線配索治具の一端側及び他端側の前記電線を前記グロメットの両端に保持させた状態で、前記電線配索治具のみを前記グロメットのいずれかの電線挿通孔から取り出すことを特徴とするグロメットの電線配索方法。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、例えば自動車のボディパネルとドアサイドパネルとの間に装着されるグロメット内に電線を挿通配索するグロメットの電線配索構造およびその電線配索方法に関する。

【0002】

【従来の技術】従来、図6に示すように、自動車のドア1に配設されたウインドスイッチ2、ウインドモータ3等に接続される電線（ワイヤーハーネス）4は、ボディ5のボディパネル6とドア1のドアサイドパネル7との間に装着された伸縮可能なグロメット8内に挿通されて配索されている。

【0003】グロメット8は、合成ゴムで一体成形されており、図7および図8に示すように、電線4を挿通する電線挿通孔9を有する両端のフランジ状のパネル取付部10、10を蛇腹部11で一体に連結してなり、ドア1の開閉操作による屈曲、伸縮に対応するようになっている。

【0004】

【発明が解決しようとする課題】しかしながら、上記従来のグロメットの電線配索構造では、図9（a）、

（b）に示すように、グロメット8はドア1の開閉操作に対応して屈曲、伸縮するが、グロメット8の電線挿通孔9に配索させた電線4は、図8に示すように、直線状に挿通されており伸縮しないため、グロメット8の屈曲、伸縮に追従できない。

【0005】このため、グロメット8の屈曲により屈曲される電線4の屈曲部に摩擦が生じるとともに、加えてグロメット8の伸縮により電線4に力が加えられることによって、被膜が破損したり断線してしまうという問題があった。

【0006】本発明は、グロメット内に配索される電線の摩耗や破損、断線を防止することができるグロメットの電線配索構造およびその電線配索方法を提供することを目的とする。

【0007】

【課題を解決するための手段】上記目的を達成するために、請求項1の発明は、伸縮可能なグロメット内に電線を挿通したグロメットの電線配索構造であって、前記グロメット内に挿通させる前記電線に伸縮自在部を設けたことを特徴とする。

【0008】このグロメットの電線配索構造では、グロメット内に挿通させる電線に伸縮自在部を設けたので、ドアの開閉操作によりグロメットが屈曲、伸縮するときに、グロメット内に挿通させた電線の伸縮自在部が屈曲、伸縮してグロメットの屈曲、伸縮に追従する。したがって、請求項1記載の発明では、グロメット内に挿通させた電線の摩耗や破損、断線が防止される。

【0009】請求項2の発明は、請求項1記載のグロメットの電線配索構造であって、前記伸縮自在部が、ループ状に形成されていることを特徴とする。

【0010】このグロメットの電線配索構造では、グロメット内に挿通させる電線をループ状に形成しているので、このループ状の部分が電線の余長部となるため、ドアの開閉操作によりグロメットが屈曲、伸縮するときに、グロメット内に挿通させた電線のループ状の部分が伸縮してグロメットの屈曲、伸縮に追従する。したがって、請求項2記載の発明では、グロメット内に挿通させた電線の摩耗や破損、断線が防止される。

【0011】請求項3の発明は、請求項2記載のグロメットの電線配索構造であって、前記ループ状の電線が、グロメットの内側面に密着していることを特徴とする。

【0012】このグロメットの電線配索構造では、請求項2の発明の作用と同等の作用に加え、ループ状の電線がグロメットの内側面に密着しているので、グロメットが補強され、グロメットの局所的な屈曲が防止されるとともに、電線がグロメット内で振動しないため、異音の発生を防止できる。

【0013】請求項4の発明は、伸縮可能なグロメット内に電線を挿通したグロメットの電線配索方法であって、棒状の電線配索治具の一方端から他方端に向けて電線を巻き回した後、前記電線配索治具を前記グロメットの一方の電線挿通孔から挿入し、前記電線配索治具の一端側及び他端側の前記電線を前記グロメットの両端に保持させた状態で、前記電線配索治具のみを前記グロメットのいずれかの電線挿通孔から取り出すことを特徴とす

る。

【0014】このグロメットの電線配索方法では、電線の摩耗や破損、断線を防止することができるグロメット内の電線の配索が容易にできる。

【0015】

【発明の実施の形態】以下、本発明に係るグロメットの電線配索構造および電線配索方法の実施形態について、図1～図4を用いて説明する。

【0016】図1は本発明に係るグロメットの電線配索構造を示す断面図、図2(a)はグロメットの斜視図、図2(b)はグロメットの一部破断した斜視図、図3はグロメット内に挿通される電線の斜視図、図4(a)～(e)は、本発明に係るグロメットの電線配索方法を示す説明図である。

【0017】グロメット20は、合成ゴムで一体成形されており、図1、図2(a)、(b)に示すように電線21を挿通する電線挿通孔22を有する両端のフランジ状のボディパネル取付部23とドアパネル取付部24と、両パネル取付部23、24を一体に連結する伸縮可能な蛇腹部25とからなる。

【0018】ボディパネル取付部23とドアパネル取付部24には、ボディパネル26とドアサイドパネル27にそれぞれ嵌着されるパネル嵌着溝28、29が設けられている。

【0019】蛇腹部25は、それぞれ膨出部31と谷部32とが交互に設けられてなり、伸縮可能となっている。なお、蛇腹部25は、螺旋状をなすように形成してもよい。

【0020】電線21は、図1、図3に示すように、グロメット20の蛇腹部25内への挿通部が、複数のループ部33が連続して平行に形成される螺旋状に形成されている。複数のループ部33は、それぞれ谷部32の内側面に密着するように形成されている。電線21は、このようにループ状に形成されているため、伸縮自在となっている。

【0021】このようなグロメットの電線配索構造では、グロメット20内に挿通させる電線21に伸縮自在部としてのループ部33が形成されているため、ドア（図示省略）の開閉操作により、グロメット20の蛇腹部25が屈曲、伸縮したときに、グロメット20の蛇腹部25内に挿通させた電線21のループ部33部が屈曲、伸縮してグロメット20の屈曲、伸縮に追従する。したがって、グロメット20内に挿通させた電線21の摩耗や破損、断線を防止することができる。

【0022】また、グロメット20内の電線21のループ部33が、蛇腹部25の内面に密着しているため、グロメット20の蛇腹部25が補強され、蛇腹部25の局部的な屈曲を防止することができる。

【0023】つぎに、上記構成からなるグロメットの電線配索方法について説明する。

【0024】(イ)まず、図4(a)に示すように、グロメット20の蛇腹部25の谷部32の内径に対し若干小径の棒状部材36の外周に、蛇腹部25の螺旋ピッチと同ピッチの螺旋溝37が形成された電線配索治具38を用意する。

【0025】(ロ)つぎに、図4(b)に示すように、電線配索治具38の螺旋溝37に沿って一方端から他方端に向けて電線21を所望ピッチの長さに巻き回しておく。

【0026】(ハ)つづいて、図4(c)に示すように、電線配索治具38の螺旋溝37に電線21を巻き回した状態で、電線配索治具38をグロメット20のボディパネル取付部23又はドアパネル取付部24のいずれか一方側の電線挿通孔22から蛇腹部25の螺旋状の谷部31に沿ってねじ込み方向に回転させながらグロメット20内に挿入していく。こうして、電線配索治具38をグロメット20内へ挿入し終わると、電線21の螺旋状部分の外周面が蛇腹部25の螺旋状の膨出部31の内側面に密着される。

【0027】(ニ)この状態で、図4(d)に示すように、グロメット20の両端に位置する電線における直線部39をボディパネル取付部23とドアパネル取付部24とのそれぞれの電線固定部40、41にテープ巻き等により固定する。

【0028】(ホ)つぎに、図4(e)に示すように、電線配索治具38を蛇腹部25の螺旋状の膨出部31に沿って反ねじ込み方向に回転させながらグロメット20内から取り出す。こうして、電線配索治具38をグロメット20から完全に取り出すと、電線21の螺旋状の部分が蛇腹部25の螺旋状の膨出部31の内側面に密着された状態でグロメット20内に配索される。

【0029】上記したグロメットの電線配索方法では、電線21の摩耗や破損、断線を防止することができるグロメット20内の電線21の配索が容易にできる。

【0030】なお、本実施形態では、グロメット20内に配索される電線21の伸縮自在部を複数条のループ部33からなる螺旋状に形成したが、単に1つのループのみを形成して伸縮自在部としてもよい。

【0031】図5は、上記実施形態の変形例を示すもので、グロメット20に配索される電線21の螺旋状部分の一端側の直線部39をボディパネル取付部23の電線固定部40にテープ巻き等により固定する際に、グロメット20の蛇腹部25の長手方向に対し、所定の傾き42を設定して固定している。

【0032】このグロメットの電線配索構造では、複数条のループ状33からなる螺旋状部分が所定の傾きをもって配索されるので、ドア1の開閉操作による電線21への応力集中を隣りのループ部33に分散できるため、グロメット20の電線21の摩耗や破損、断線を防止することができる。

【0033】以上、実施形態について説明したが、本発明はこれに限定されるものではなく、構成の要旨に付随する各種の変更が可能である。

【0034】

【発明の効果】以上の説明より明らかなように、請求項1の発明によれば、グロメット内に挿通させる電線に伸縮自在部を設けたので、ドアの開閉操作によりグロメットが屈曲、伸縮するときに、電線の伸縮自在部が追従して屈曲、伸縮するため、グロメット内に挿通させた電線の摩耗や破損、断線を防止することができる。

【0035】請求項2の発明によれば、電線の伸縮自在部がループ状に形成されているので、請求項1の発明と同等の効果を得ることができる。

【0036】請求項3の発明によれば、請求項2の発明の効果に加えて、ループ状の電線がグロメットの内側面に密着しているため、グロメットを補強できるとともに、電線の振動を防止して異音が発生するのを防止できる。

【0037】請求項4の発明によれば、電線の摩耗や破損、断線を防止することができるグロメット内の電線の配線が容易にできる。

【図面の簡単な説明】

【図1】本発明に係るグロメットの電線配線構造の実施形態を示す断面図である。

【図2】(a)は、実施形態に係るグロメットの斜視図である。(b)は、実施形態に係るグロメットの一部破断した斜視図である。

【図3】実施形態に係るグロメット内に挿通される電線の斜視図である。

【図4】(a)～(e)は、本発明に係るグロメットの電線配線方法を示す説明図である。

【図5】本発明に係るグロメットの電線配線構造の変形例を示す断面図である。

【図6】従来のグロメットの電線配線構造の全体を示す説明図である。

【図7】従来のグロメットの電線配線構造を示す斜視図である。

【図8】従来のグロメットの電線配線構造を示す断面図である。

【図9】(a)、(b)は、従来のグロメットの電線配線構造のドアの開閉操作によるグロメットの動作説明図である。

【符号の説明】

20…グロメット

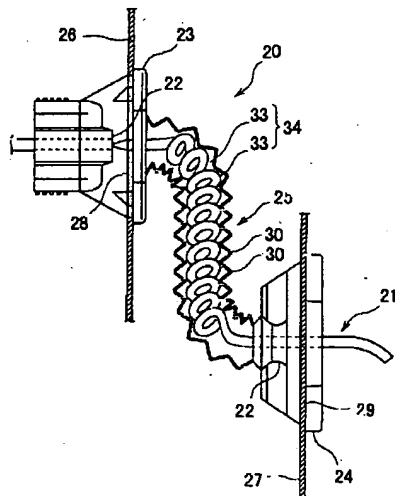
21…電線

22…電線挿通孔

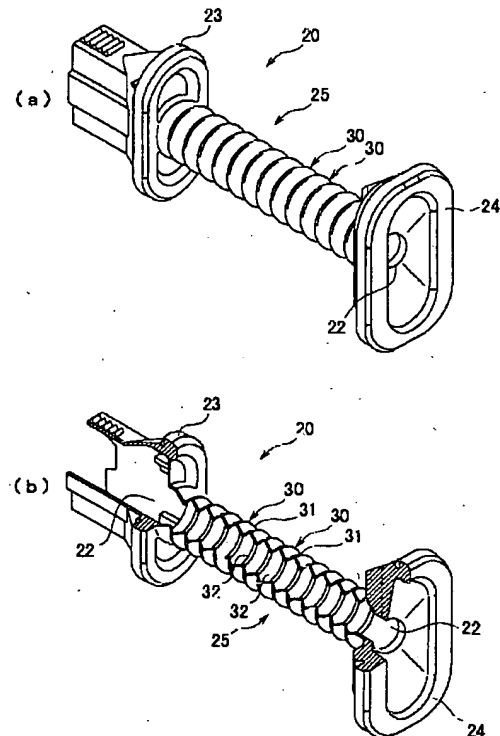
33…ループ部(伸縮自在部)

38…電線配線治具

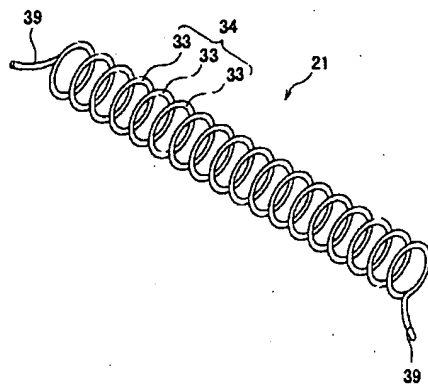
【図1】



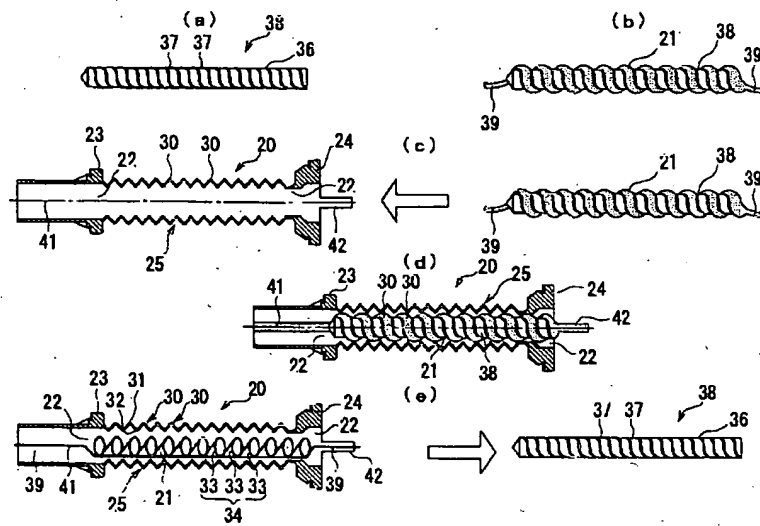
【図2】



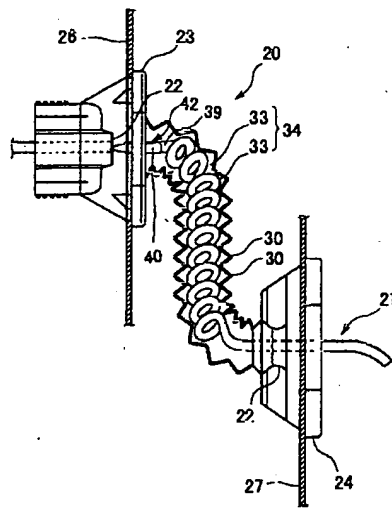
【図3】



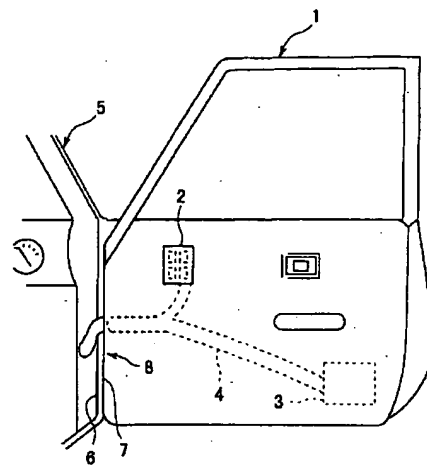
【図4】



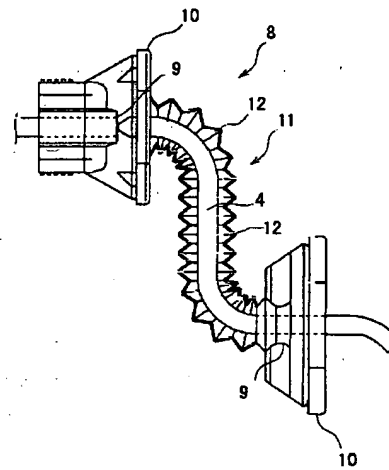
【図5】



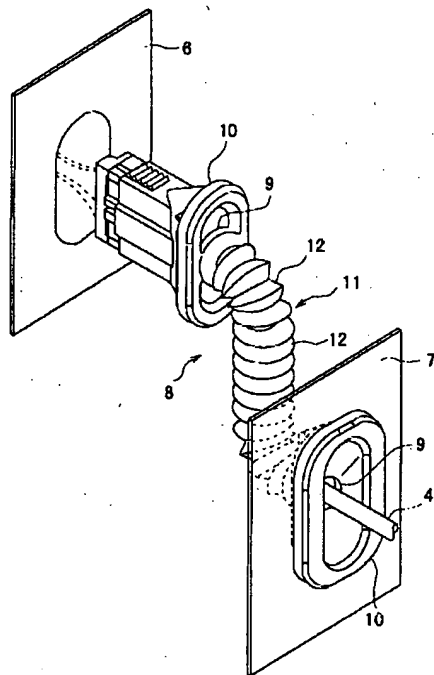
【図6】



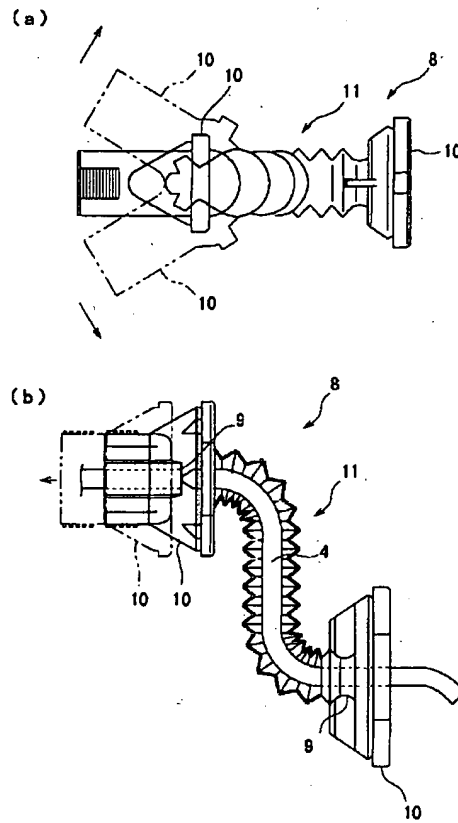
【図8】



【図7】



【図9】



フロントページの続き

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			Y
			F
			A

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 DD10 DG04 DG06  
 5G363 AA07 BA02 BB01 CA18 CB08  
 DC03

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CLAIMS

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## [Claim(s)]

[Claim 1] Electric-wire \*\*\*\* structure of the grommet characterized by preparing the elastic section in said electric wire which is the electric-wire \*\*\*\* structure of the grommet which inserted in the electric wire in the grommet which can be expanded and contracted, and is made to insert in in said grommet.

[Claim 2] Electric-wire \*\*\*\* structure of the grommet characterized by being the electric-wire \*\*\*\* structure of a grommet according to claim 1, and said elastic section being the loop-formation section.

[Claim 3] Electric-wire \*\*\*\* structure of the grommet which is the electric-wire \*\*\*\* structure of a grommet according to claim 2, and is characterized by the electric wire of said loop-formation section having stuck to the medial surface of a grommet.

[Claim 4] It is the electric-wire \*\*\*\* approach of the grommet which inserted in the electric wire in the grommet which can be expanded and contracted. After [ a rod-like electric-wire \*\*\*\* fixture ] coiling an electric wire about towards an another side edge from an edge on the other hand, in the condition of having inserted said electric-wire \*\*\*\* fixture from one electric-wire insertion hole of said grommet, and having made said electric wire by the side of the end of said electric-wire \*\*\*\* fixture, and the other end holding to the both ends of said grommet The electric-wire \*\*\*\* approach of the grommet characterized by picking out only said electric-wire \*\*\*\* fixture from which electric-wire insertion hole of said grommet.

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[Translation done.]

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the electric-wire \*\*\*\* structure and its electric-wire \*\*\*\* approach of the grommet which carries out insertion \*\*\*\* of the electric wire into the grommet with which it is equipped between the body panel of an automobile, and a door side panel.

[0002]

[Description of the Prior Art] As conventionally shown in drawing 6, the window switch 2 arranged in the door 1 of an automobile and the electric wire (wire harness) 4 connected to window motor 3 are inserted in the grommet 8 which can be expanded and contracted and with which it was equipped between the body panel 6 of the body 5, and the door side panel 7 of a door 1, and is \*\*\*\*(ed).

[0003] The grommet 8 is really fabricated by synthetic rubber, as shown in drawing 7 and drawing 8, comes to connect with one the panel mounting sections 10 and 10 of the shape of a flange of both ends which have the electric-wire insertion hole 9 which inserts in an electric wire 4 in the bellows section 11, and corresponds to the crookedness by the switching operation of a door 1, and telescopic motion.

[0004]

[Problem(s) to be Solved by the Invention] However, a grommet 8 corresponds to the switching operation of a door 1, and with the electric-wire \*\*\*\* structure of the above-mentioned conventional grommet, as shown in drawing 9 (a) and (b), since the electric wire 4 made to \*\*\*\* to the electric-wire insertion hole 9 of a grommet 8 is inserted in the shape of a straight line and is not expanded and contracted as shown in drawing 8, although it crooks, expands and contracts, crookedness of a grommet 8 and telescopic motion cannot be followed.

[0005] For this reason, while friction arose in the flexion of the electric wire 4 crooked by crookedness of a grommet 8, there was a problem of a coat being damaged or disconnecting, by in addition applying the force to an electric wire 4 by telescopic motion of a grommet 8.

[0006] This invention aims at offering the electric-wire \*\*\*\* structure and its electric-wire \*\*\*\* approach of the grommet which can prevent wear of the electric wire \*\*\*\*(ed) in a grommet, breakage, and an open circuit.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention of claim 1 is the electric-wire \*\*\*\* structure of the grommet which inserted in the electric wire in the grommet which can be expanded and contracted, and is characterized by preparing the elastic section in said electric wire made to insert in in said grommet.

[0008] The elastic section of the electric wire made to insert in in a grommet crooks, expands and contracts, and with the electric-wire \*\*\*\* structure of this grommet, since the elastic section was prepared in the electric wire made to insert in in a grommet, when a grommet crooks, expands and contracts by the switching operation of a door, it follows crookedness of a grommet, and telescopic motion. Therefore, in invention according to claim 1, wear of the electric wire made to insert in in a grommet, breakage, and an open circuit are prevented.

[0009] Invention of claim 2 is the electric-wire \*\*\*\* structure of a grommet according to claim 1, and is characterized by forming said elastic section in the shape of a loop formation.

[0010] The part of the shape of a loop formation of the electric wire made to insert in in a grommet expands and contracts, and with the electric-wire \*\*\*\* structure of this grommet, since the electric wire made to insert in in a grommet is formed in the shape of a loop formation and the part of the shape of this loop formation serves as extra length of an electric wire, when a grommet crooks, expands and contracts by the switching operation of a door, crookedness of a grommet and telescopic motion are followed. Therefore, in invention according to claim 2, wear of the electric wire made to insert in in a grommet, breakage, and an open circuit are prevented.

[0011] Invention of claim 3 is the electric-wire \*\*\*\* structure of a grommet according to claim

2, and is characterized by the electric wire of the shape of said loop formation having stuck to the medial surface of a grommet.

[0012] With the electric-wire \*\*\*\* structure of this grommet, since an electric wire does not vibrate within a grommet while a grommet is reinforced and local crookedness of a grommet is prevented, since the loop-formation-like electric wire has stuck to the medial surface of a grommet in addition to an operation equivalent to an operation of invention of claim 2, generating of an allophone can be prevented.

[0013] Invention of claim 4 is the electric-wire \*\*\*\* approach of the grommet which inserted in the electric wire in the grommet which can be expanded and contracted. After [ a rod-like electric-wire \*\*\*\* fixture ] coiling an electric wire about towards an another side edge from an edge on the other hand. Said electric-wire \*\*\*\* fixture is inserted from one electric-wire insertion hole of said grommet, and it is characterized by picking out only said electric-wire \*\*\*\* fixture from which electric-wire insertion hole of said grommet in the condition of having made said electric wire by the side of the end of said electric-wire \*\*\*\* fixture, and the other end holding to the both ends of said grommet.

[0014] By the electric-wire \*\*\*\* approach of this grommet, \*\*\*\* of the electric wire in the grommet which can prevent wear of an electric wire, breakage, and an open circuit is made easily.

[0015]

[Embodiment of the Invention] Hereafter, the electric-wire \*\*\*\* structure of the grommet concerning this invention and the operation gestalt of the electric-wire \*\*\*\* approach are explained using drawing 1 - drawing 4.

[0016] Drawing 3 is the perspective view to which the perspective view of a grommet carried out the sectional view and drawing 2 (a) which show the electric-wire \*\*\*\* structure of the grommet which drawing 1 requires for this invention, and the grommet fractured drawing 2 (b) the part, and the perspective view of the electric wire inserted in in a grommet. Drawing 4 (a) - (e) is the explanatory view showing the electric-wire \*\*\*\* approach of the grommet concerning this invention.

[0017] The grommet 20 is really fabricated by synthetic rubber, and consists of the body panel mounting section 23 of the shape of a flange of the both ends which have the electric-wire insertion hole 22 which inserts in an electric wire 21 as shown in drawing 1, drawing 2 (a), and (b), the door-panel attachment section 24, and the bellows section 25 that can be expanded and contracted and that connects both the panel mounting sections 23 and 24 with one.

[0018] The panel attachment slots 28 and 29 attached in the body panel 26 and the door side panel 27, respectively are established in the body panel mounting section 23 and the door-panel attachment section 24.

[0019] It comes to prepare the bulge section 31 and a trough 32 by turns, and they can expand and contract the bellows section 25, respectively. In addition, the bellows section 25 may be formed so that the shape of a spiral may be made.

[0020] As an electric wire 21 is shown in drawing 1 and drawing 3, two or more loop-formation sections 33 in which two or more loop-formation sections 33 are continuously formed for the insertion section into the bellows section 25 of a grommet 20 in parallel and which are formed spirally are formed so that it may stick to the medial surface of a trough 32, respectively. Since the electric wire 21 is formed in the shape of a loop formation in this way, it is elastic.

[0021] The loop-formation section 33 section of the electric wire 21 made to insert in in the bellows section 25 of a grommet 20 crooks, expands and contracts, and with such electric-wire \*\*\*\* structure of a grommet, since the loop-formation section 33 as the elastic section is formed in the electric wire 21 made to insert in in a grommet 20, when the bellows section 25 of a grommet 20 crooked, expands and contracts by the switching operation of a door (illustration abbreviation), it follows crookedness of a grommet 20, and telescopic motion. Therefore, wear of the electric wire 21 made to insert in in a grommet 20, breakage, and an open circuit can be prevented.

[0022] Moreover, since the loop-formation section 33 of the electric wire 21 in a grommet 20 has stuck to the inside of the bellows section 25, the bellows section 25 of a grommet 20 is reinforced and local crookedness of the bellows section 25 can be prevented.

[0023] Below, the electric-wire \*\*\*\* approach of the grommet which consists of the above-mentioned configuration is explained.

[0024] (b) First, as shown in drawing 4 (a), prepare a little the electric-wire \*\*\*\* fixture 38 with which the spiral slot 37 of the spiral pitch of the bellows section 25 and this pitch was formed in the periphery of the cylindrical member 36 of a minor diameter to the bore of the trough 32 of the bellows section 25 of a grommet 20.

[0025] (b) Next, as shown in drawing 4 (b), on the other hand, coil an electric wire 21 around the die length of a request pitch about towards an another side edge along the spiral slot 37 of

the electric-wire \*\*\*\* fixture 38 from an edge.

[0026] (c) the condition of coiling the electric wire 21 around the spiral slot 37 of the electric-wire \*\*\*\* fixture 38 about as it continued and was shown in drawing 4 (c) — the electric-wire \*\*\*\* fixture 38 — either the body panel mounting section 23 of a grommet 20, or the door-panel attachment section 24 — insert into the grommet 20, making it rotate in the direction of a bell and spigot along with the spiral trough 31 of the bellows section 25 from the near electric-wire insertion hole 22. In this way, if it finishes inserting the electric-wire \*\*\*\* fixture 38 into a grommet 20, it will be stuck to the peripheral face of the spiral part of an electric wire 21 by the medial surface of the spiral bulge section 31 of the bellows section 25.

[0027] (d) In this condition, as shown in drawing 4 (d), fix to each electric-wire fixed part 40 and 41 of the body panel mounting section 23 and the door-panel attachment section 24 the bay 39 in the electric wire located in the both ends of a grommet 20 by a tape volume etc.

[0028] (e) Take out from the inside of a grommet 20, rotating the electric-wire \*\*\*\* fixture 38 in the direction of an anti-bell and spigot along with the spiral bulge section 31 of the bellows section 25 next, as shown in drawing 4 (e). In this way, when the electric-wire \*\*\*\* fixture 38 is completely picked out from a grommet 20, the spiral part of an electric wire 21 is \*\*\*\*(ed) in a grommet 20, after having been stuck by the medial surface of the spiral bulge section 31 of the bellows section 25.

[0029] By the electric-wire \*\*\*\* approach of the above-mentioned grommet, \*\*\*\* of the electric wire 21 in the grommet 20 which can prevent wear of an electric wire 21, breakage, and an open circuit is made easily.

[0030] In addition, although the elastic section of the electric wire 21 \*\*\*\*(ed) in a grommet 20 was formed with this operation gestalt in the shape of [ which consists of the loop-formation section 33 of two or more articles ] a spiral, only one loop formation is formed and it is good also as the elastic section.

[0031] Drawing 5 shows the modification of the above-mentioned operation gestalt, in case it fixes to the electric-wire fixed part 40 of the body panel mounting section 23 the bay 39 by the side of the end of the spiral part of the electric wire 21 \*\*\*\*(ed) by the grommet 20 by a tape volume etc., to the longitudinal direction of the bellows section 25 of a grommet 20, sets up the predetermined inclination 42 and is fixed.

[0032] With the electric-wire \*\*\*\* structure of this grommet, since the spiral part which consists of the shape of a loop formation 33 of two or more articles is \*\*\*\*(ed) with a predetermined inclination and the stress concentration to the electric wire 21 by the switching operation of a door 1 can be distributed in the next loop-formation section 33, wear of the electric wire 21 of a grommet 20, breakage, and an open circuit can be prevented.

[0033] As mentioned above, although the operation gestalt was explained, various kinds of modification which is not limited to this and accompanies the summary of a configuration is possible for this invention.

[0034]

[Effect of the Invention] The elastic section of an electric wire follows, and since the elastic section was prepared in the electric wire made to insert in in a grommet according to invention of claim 1 so that more clearly than the above explanation, when a grommet crooks, expands and contracts by the switching operation of a door, since it crooks, expands and contracts, wear of the electric wire made to insert in in a grommet, breakage, and an open circuit can be prevented.

[0035] According to invention of claim 2, since the elastic section of an electric wire is formed in the shape of a loop formation, effectiveness equivalent to invention of claim 1 can be acquired.

[0036] Since the loop-formation-like electric wire has stuck to the medial surface of a grommet in addition to the effect of the invention of claim 2, while being able to reinforce a grommet according to invention of claim 3, it can prevent that prevent vibration of an electric wire and an allophone occurs.

[0037] According to invention of claim 4, \*\*\*\* of the electric wire in the grommet which can prevent wear of an electric wire, breakage, and an open circuit is made easily.

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[Translation done.]

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TECHNICAL FIELD

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[Field of the Invention] This invention relates to the electric-wire \*\*\*\* structure and its electric-wire \*\*\*\* approach of the grommet which carries out insertion \*\*\*\* of the electric wire into the grommet with which it is equipped between the body panel of an automobile, and a door side panel.

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PRIOR ART

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[Description of the Prior Art] As conventionally shown in drawing 6, the window switch 2 arranged in the door 1 of an automobile and the electric wire (wire harness) 4 connected to window motor 3 are inserted in the grommet 8 which can be expanded and contracted and with which it was equipped between the body panel 6 of the body 5, and the door side panel 7 of a door 1, and is \*\*\* (ed).

[0003] The grommet 8 is really fabricated by synthetic rubber, as shown in drawing 7 and drawing 8, comes to connect with one the panel mounting sections 10 and 10 of the shape of a flange of both ends which have the electric-wire insertion hole 9 which inserts in an electric wire 4 in the bellows section 11, and corresponds to the crookedness by the switching operation of a door 1, and telescopic motion.

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EFFECT OF THE INVENTION

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[Effect of the Invention] The elastic section of an electric wire follows, and since the elastic section was prepared in the electric wire made to insert in in a grommet according to invention of claim 1 so that more clearly than the above explanation, when a grommet crooks, expands and contracts by the switching operation of a door, since it crooks, expands and contracts, wear of the electric wire made to insert in in a grommet, breakage, and an open circuit can be prevented.

[0035] According to invention of claim 2, since the elastic section of an electric wire is formed in the shape of a loop formation, effectiveness equivalent to invention of claim 1 can be acquired.

[0036] Since the loop-formation-like electric wire has stuck to the medial surface of a grommet in addition to the effect of the invention of claim 2, while being able to reinforce a grommet according to invention of claim 3, it can prevent that prevent vibration of an electric wire and an allophone occurs.

[0037] According to invention of claim 4, \*\*\* of the electric wire in the grommet which can prevent wear of an electric wire, breakage, and an open circuit is made easily.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, a grommet 8 corresponds to the switching operation of a door 1, and with the electric-wire \*\*\* structure of the above-mentioned conventional grommet, as shown in drawing 9 (a) and (b), since the electric wire 4 made to \*\*\* to the electric-wire insertion hole 9 of a grommet 8 is inserted in in the shape of a straight line and is not expanded and contracted as shown in drawing 8, although it crooks, expands and contracts, crookedness of a grommet 8 and telescopic motion cannot be followed.

[0005] For this reason, while friction arose in the flection of the electric wire 4 crooked by crookedness of a grommet 8, there was a problem of a coat being damaged or disconnecting, by in addition applying the force to an electric wire 4 by telescopic motion of a grommet 8.

[0006] This invention aims at offering the electric-wire \*\*\* structure and its electric-wire \*\*\* approach of the grommet which can prevent wear of the electric wire \*\*\* (ed) in a grommet, breakage, and an open circuit.

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## MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention of claim 1 is the electric-wire \*\*\*\* structure of the grommet which inserted in the electric wire in the grommet which can be expanded and contracted, and is characterized by preparing the elastic section in said electric wire made to insert in in said grommet.

[0008] The elastic section of the electric wire made to insert in in a grommet crooks, expands and contracts, and with the electric-wire \*\*\*\* structure of this grommet, since the elastic section was prepared in the electric wire made to insert in in a grommet, when a grommet crooks, expands and contracts by the switching operation of a door, it follows crookedness of a grommet, and telescopic motion. Therefore, in invention according to claim 1, wear of the electric wire made to insert in in a grommet, breakage, and an open circuit are prevented.

[0009] Invention of claim 2 is the electric-wire \*\*\*\* structure of a grommet according to claim 1, and is characterized by forming said elastic section in the shape of a loop formation.

[0010] The part of the shape of a loop formation of the electric wire made to insert in in a grommet expands and contracts, and with the electric-wire \*\*\*\* structure of this grommet, since the electric wire made to insert in in a grommet is formed in the shape of a loop formation and the part of the shape of this loop formation serves as extra length of an electric wire, when a grommet crooks, expands and contracts by the switching operation of a door, crookedness of a grommet and telescopic motion are followed. Therefore, in invention according to claim 2, wear of the electric wire made to insert in in a grommet, breakage, and an open circuit are prevented.

[0011] Invention of claim 3 is the electric-wire \*\*\*\* structure of a grommet according to claim 2, and is characterized by the electric wire of the shape of said loop formation having stuck to the medial surface of a grommet.

[0012] With the electric-wire \*\*\*\* structure of this grommet, since an electric wire does not vibrate within a grommet while a grommet is reinforced and local crookedness of a grommet is prevented, since the loop-formation-like electric wire has stuck to the medial surface of a grommet in addition to an operation equivalent to an operation of invention of claim 2, generating of an allophone can be prevented.

[0013] Invention of claim 4 is the electric-wire \*\*\*\* approach of the grommet which inserted in the electric wire in the grommet which can be expanded and contracted. After [ a rod-like electric-wire \*\*\*\* fixture ] coiling an electric wire about towards an another side edge from an edge on the other hand, Said electric-wire \*\*\*\* fixture is inserted from one electric-wire insertion hole of said grommet, and it is characterized by picking out only said electric-wire \*\*\*\* fixture from which electric-wire insertion hole of said grommet in the condition of having made said electric wire by the side of the end of said electric-wire \*\*\*\* fixture, and the other end holding to the both ends of said grommet.

[0014] By the electric-wire \*\*\*\* approach of this grommet, \*\*\*\* of the electric wire in the grommet which can prevent wear of an electric wire, breakage, and an open circuit is made easily.

[0015]

[Embodiment of the Invention] Hereafter, the electric-wire \*\*\*\* structure of the grommet concerning this invention and the operation gestalt of the electric-wire \*\*\*\* approach are explained using drawing 1 - drawing 4.

[0016] Drawing 3 is the perspective view to which the perspective view of a grommet carried out the sectional view and drawing 2 (a) which show the electric-wire \*\*\*\* structure of the grommet which drawing 1 requires for this invention, and the grommet fractured drawing 2 (b) the part, and the perspective view of the electric wire inserted in in a grommet. Drawing 4 (a) - (e) is the explanatory view showing the electric-wire \*\*\*\* approach of the grommet concerning this invention.

[0017] The grommet 20 is really fabricated by synthetic rubber, and consists of the body panel mounting section 23 of the shape of a flange of the both ends which have the electric-wire insertion hole 22 which inserts in an electric wire 21 as shown in drawing 1, drawing 2 (a), and

(b), the door-panel attachment section 24, and the bellows section 25 that can be expanded and contracted and that connects both the panel mounting sections 23 and 24 with one.

[0018] The panel attachment slots 28 and 29 attached in the body panel 26 and the door side panel 27, respectively are established in the body panel mounting section 23 and the door-panel attachment section 24.

[0019] It comes to prepare the bulge section 31 and a trough 32 by turns, and they can expand and contract the bellows section 25, respectively. In addition, the bellows section 25 may be formed so that the shape of a spiral may be made.

[0020] As an electric wire 21 is shown in drawing 1 and drawing 3, two or more loop-formation sections 33 in which two or more loop-formation sections 33 are continuously formed for the insertion section into the bellows section 25 of a grommet 20 in parallel and which are formed spirally are formed so that it may stick to the medial surface of a trough 32, respectively. Since the electric wire 21 is formed in the shape of a loop formation in this way, it is elastic.

[0021] The loop-formation section 33 section of the electric wire 21 made to insert in in the bellows section 25 of a grommet 20 crooks, expands and contracts, and with such electric-wire \*\*\*\* structure of a grommet, since the loop-formation section 33 as the elastic section is formed in the electric wire 21 made to insert in in a grommet 20, when the bellows section 25 of a grommet 20 crooked, expands and contracts by the switching operation of a door (illustration abbreviation), it follows crookedness of a grommet 20, and telescopic motion. Therefore, wear of the electric wire 21 made to insert in in a grommet 20, breakage, and an open circuit can be prevented.

[0022] Moreover, since the loop-formation section 33 of the electric wire 21 in a grommet 20 has stuck to the inside of the bellows section 25, the bellows section 25 of a grommet 20 is reinforced and local crookedness of the bellows section 25 can be prevented.

[0023] Below, the electric-wire \*\*\*\* approach of the grommet which consists of the above-mentioned configuration is explained.

[0024] (b) First, as shown in drawing 4 (a), prepare a little the electric-wire \*\*\*\* fixture 38 with which the spiral slot 37 of the spiral pitch of the bellows section 25 and this pitch was formed in the periphery of the cylindrical member 36 of a minor diameter to the bore of the trough 32 of the bellows section 25 of a grommet 20.

[0025] (b) Next, as shown in drawing 4 (b), on the other hand, coil an electric wire 21 around the die length of a request pitch about towards an another side edge along the spiral slot 37 of the electric-wire \*\*\*\* fixture 38 from an edge.

[0026] (c) the condition of coiling the electric wire 21 around the spiral slot 37 of the electric-wire \*\*\*\* fixture 38 about as it continued and was shown in drawing 4 (c) — the electric-wire \*\*\*\* fixture 38 — either the body panel mounting section 23 of a grommet 20, or the door-panel attachment section 24 — insert into the grommet 20, making it rotate in the direction of a bell and spigot along with the spiral trough 31 of the bellows section 25 from the near electric-wire insertion hole 22. In this way, if it finishes inserting the electric-wire \*\*\*\* fixture 38 into a grommet 20, it will be stuck to the peripheral face of the spiral part of an electric wire 21 by the medial surface of the spiral bulge section 31 of the bellows section 25.

[0027] (d) In this condition, as shown in drawing 4 (d), fix to each electric-wire fixed part 40 and 41 of the body panel mounting section 23 and the door-panel attachment section 24 the bay 39 in the electric wire located in the both ends of a grommet 20 by a tape volume etc.

[0028] (e) Take out from the inside of a grommet 20, rotating the electric-wire \*\*\*\* fixture 38 in the direction of an anti-bell and spigot along with the spiral bulge section 31 of the bellows section 25 next, as shown in drawing 4 (e). In this way, when the electric-wire \*\*\*\* fixture 38 is completely picked out from a grommet 20, the spiral part of an electric wire 21 is \*\*\*\*(ed) in a grommet 20, after having been stuck by the medial surface of the spiral bulge section 31 of the bellows section 25.

[0029] By the electric-wire \*\*\*\* approach of the above-mentioned grommet, \*\*\*\* of the electric wire 21 in the grommet 20 which can prevent wear of an electric wire 21, breakage, and an open circuit is made easily.

[0030] In addition, although the elastic section of the electric wire 21 \*\*\*\*(ed) in a grommet 20 was formed with this operation gestalt in the shape of [ which consists of the loop-formation section 33 of two or more articles ] a spiral, only one loop formation is formed and it is good also as the elastic section.

[0031] Drawing 5 shows the modification of the above-mentioned operation gestalt, in case it fixes to the electric-wire fixed part 40 of the body panel mounting section 23 the bay 39 by the side of the end of the spiral part of the electric wire 21 \*\*\*\*(ed) by the grommet 20 by a tape volume etc., to the longitudinal direction of the bellows section 25 of a grommet 20, sets up the predetermined inclination 42 and is fixed.

[0032] With the electric-wire \*\*\*\* structure of this grommet, since the spiral part which consists of the shape of a loop formation 33 of two or more articles is \*\*\*\*(ed) with a predetermined inclination and the stress concentration to the electric wire 21 by the switching operation of a door 1 can be distributed in the next loop-formation section 33, wear of the electric wire 21 of a grommet 20, breakage, and an open circuit can be prevented.

[0033] As mentioned above, although the operation gestalt was explained, various kinds of modification which is not limited to this and accompanies the summary of a configuration is possible for this invention.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the sectional view showing the operation gestalt of the electric-wire \*\*\*\* structure of the grommet concerning this invention.

[Drawing 2] (a) is the perspective view of the grommet concerning an operation gestalt. (b) is the perspective view which the grommet concerning an operation gestalt fractured the part.

[Drawing 3] It is the perspective view of the electric wire inserted in in the grommet concerning an operation gestalt.

[Drawing 4] (a) - (e) is the explanatory view showing the electric-wire \*\*\*\* approach of the grommet concerning this invention.

[Drawing 5] It is the sectional view showing the modification of the electric-wire \*\*\*\* structure of the grommet concerning this invention.

[Drawing 6] It is the explanatory view showing the whole electric-wire \*\*\*\* structure of the conventional grommet.

[Drawing 7] It is the perspective view showing the electric-wire \*\*\*\* structure of the conventional grommet.

[Drawing 8] It is the sectional view showing the electric-wire \*\*\*\* structure of the conventional grommet.

[Drawing 9] (a) and (b) are the explanatory views of the grommet by the switching operation of the door of the electric-wire \*\*\*\* structure of the conventional grommet of operation.

[Description of Notations]

20 -- Grommet

21 -- Electric wire

22 -- Electric-wire insertion hole

33 -- Loop-formation section (elastic section)

38 -- Electric-wire \*\*\*\* fixture

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[Translation done.]

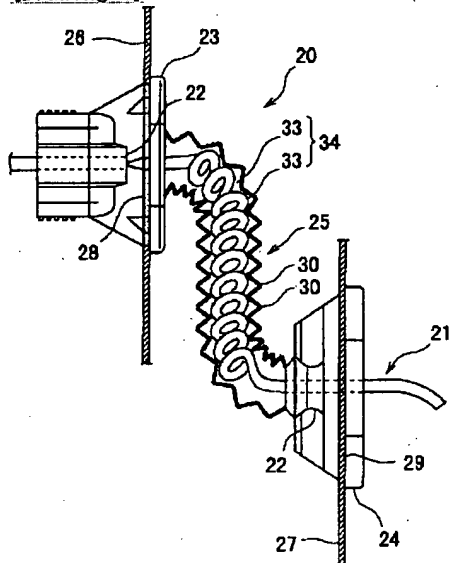
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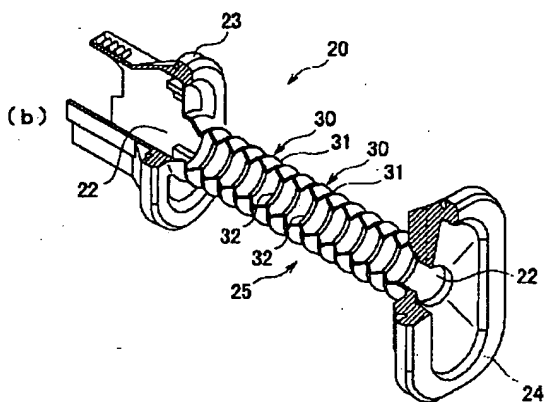
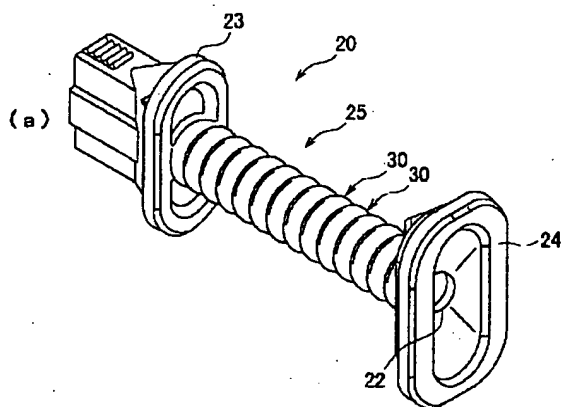
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## DRAWINGS

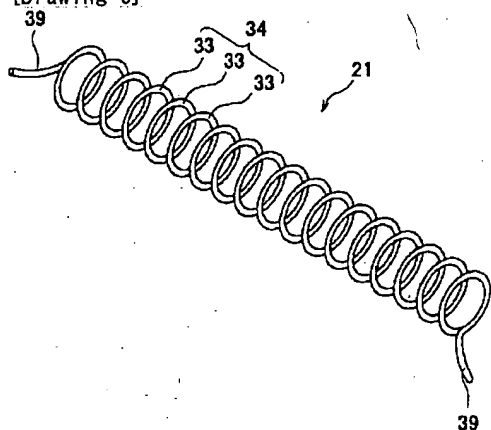
[Drawing 1]



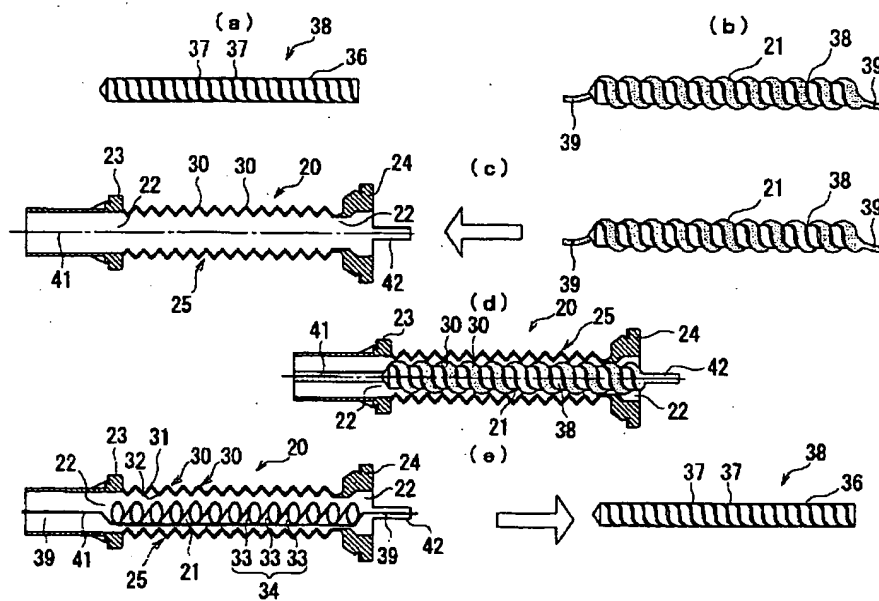
[Drawing 2]



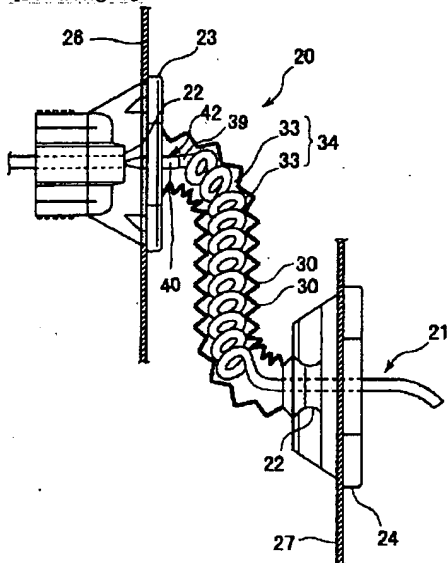
[Drawing 3]



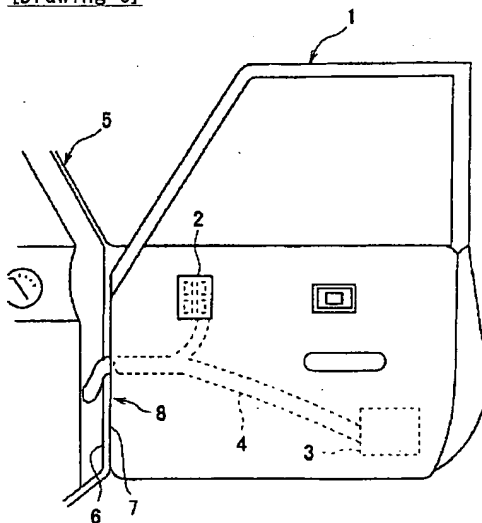
[Drawing 4]



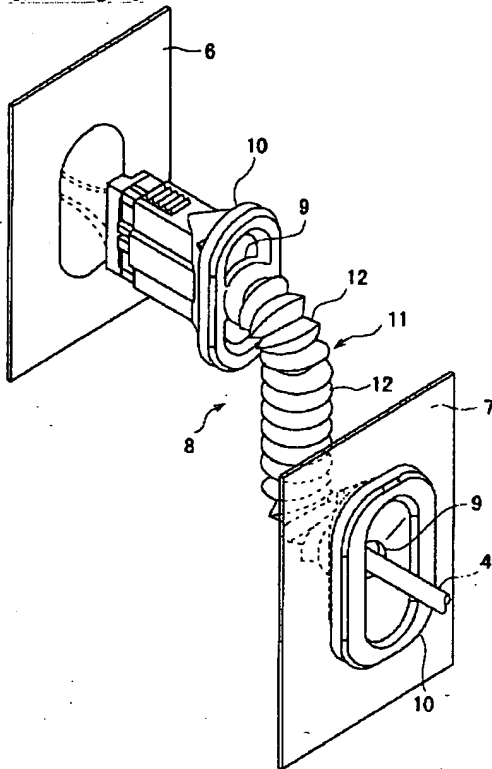
[Drawing 5]



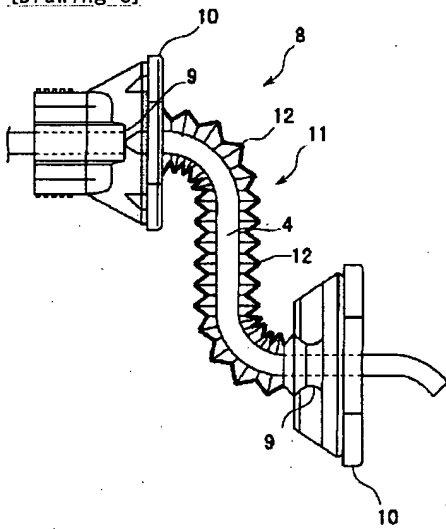
[Drawing 6]



[Drawing 7]

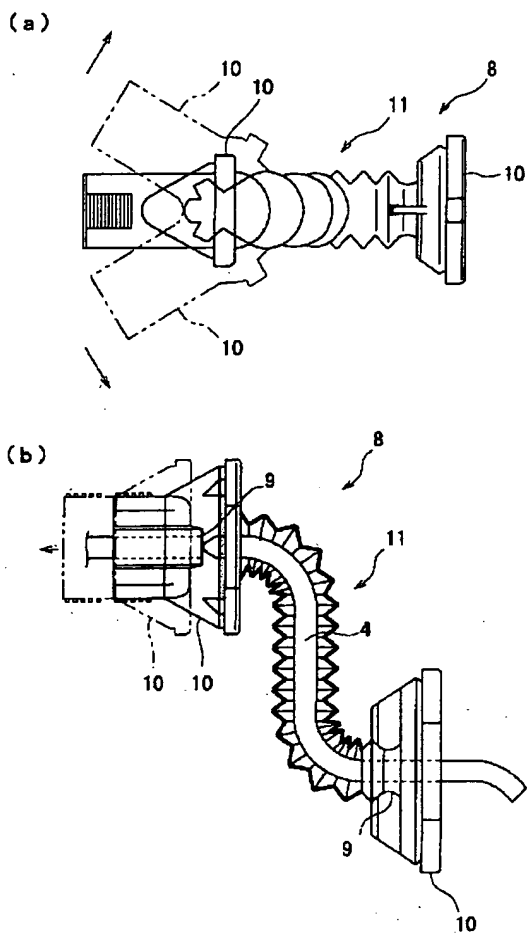


[Drawing 8]



[Drawing 9]





[Translation done.]

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